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COMPARISON OF KEEPING QUALITIES OF *Alestes nurse* DISPLAYED IN TRADITIONAL AND IMPROVED RETAIL TABLES

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ABSTRACT

The study accessed the quality changes of Alestes nurse displayed at 31-33^{o}C average daily temperature on different platforms, the traditional retail table used by fish processors and the NIFFR improved retail table. The fishes were displayed on the tables for 9 hours and quality attributes were monitored hourly by trained panelists. For A. nurse, the gills and intestine recorded faster deterioration starting from the fourth and fifth hours for samples in the traditional table while those in improved table were prolonged by one hour. Scores for skin brightness and texture did not indicate quality deterioration throughout the display period. However, at the end of the storage time, samples in screened table recorded 1.5 x 10^{4} cfu/g while samples in unscreened table recorded 3.7 x 10 ^{7} cfu/g. The study shows the effectiveness of the improved table over the traditional table in enhancing the keeping quality, minimizing fish contamination and improving the general hygiene of fresh fish.

INTRODUCTION

Fish as food is susceptible to rapid spoilage at ambient temperature. They deteriorate during post-mortern period as a result of a variety of biochemical and microbial breakdown mechanisms. In the high ambient tropical temperature, fish will spoil within twelve to twenty hours depending on species, methods of capture and handling condition of fish (Clucas, 1982). The degradation of the tissue is brought about both by endogenous fish enzymes and by microorganism that are present on the surface of the skin, or the gills and in the intestines.

An estimated 20-50% of the fish produced in the remote coastal centre's and hinter land of many tropical countries perish before they get to the consumers due to poor handling, preservation and processing practices adopted by the artisanal fishermen, fish farmers and fisheries entrepreneurs (Eyo, 2001). After landing in the landing centre's, the catch also passes through different marketing chains and the time required to reach the destination varies widely according to location but it often takes a considerable portion of the normal shelf life of a tropical fish species.

Freshness is one of the most important parameters of quality in most markets. Fresh products often achieve a higher price based on general attitude among consumers that "fresh is better" Freshness is a property of fish that has a considerable influence on its quality. It is the most important single criterion for judging the quality of the majority of fish products. Loss of freshness followed by spoilage is a complex combination of microbiological, chemical

and physical processes (Pedrosa-Menabrito and Regenstein, 1990). The shelf life of freshly harvested fish depends on the bacterial flora, storage temperature, handling and physiological condition of fish. The shelf life reflects the quality of the final fish product either fresh or processed. The quality of fish can be estimated by sensory tests, microbial methods, measuring volatile compounds and lipid oxidation, determination of changes in muscle proteins, ATP breakdown products and physical changes (including electrical properties of skin) in fish (Abbas *et al.* 2008).

Sensory inspection of processed fish is used in the fish industry to find defects that have occurred during handling and processing (Oehlenschlanger, 1998).Various types of analyses have been developed to measure the loss of fish freshness and to detect spoilage. When management strategies are proposed for a fishery, adequate consideration is not often given to the very important aspect of enhancing hygiene. This is could be achieved through improved management of the resources, improvement in fish handling, processing, good hygiene practices, storage and distribution.

In order to reduce fish losses due to insect infestation a screen retail table was designed to prevent insect from gaining access to the fish (Adebayo *et al.* 2008). Consequently the fish retail table was improved to enhance fish quality and to make the raw material quality be: (i) the best product to the consumers; (ii) assess a better management of fresh stocks. In this study the keeping qualities of *A. nurse* displayed in the improved retail table and the traditional table were evaluated.

MATERIALS AND METHODS

Design of improved retail table

The table (Fig 1and 2) with dimensions of 1.20m by 0.60m by 1.10 (LxWxH) was designed and constructed. The top compartment is a cage screened with a netting material to screen insects and flies, and a cutting board on the outer top cover. The table surface is covered with Formica and small drilled openings for water to drain. A small opening of 0.53m by 0.30m (LxW) forms the access door. The table was constructed and furnished so that it can be maintained in a clean and hygienic state.

Fig. 1 NIFFR Improved Retail Table

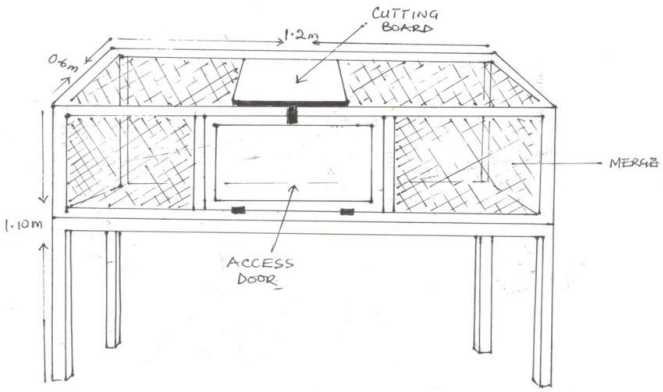

Fig. 2: Sketch NIFFR Improved Retail Table

Quality Assessment

Fresh fish samples were procured in Una from traditional fishermen soon after landing. Observation of fresh fish started from the landing site (zero hour) until 9 hours. The fish were carried in wetted jute bags to enhance preservation and transported to National Institute for Freshwater Fisheries Research (NIFFR) laboratory for monitoring, evaluation and comparison of changes in the quality of the fish products. The samples were displayed in the traditional table and NIFFR improved retail table. The sensory analysis was made using the Quality Index Method (QIM), with some modifications. Each assessment was carried out by five trained panelists. Six fish from each storage time were evaluated on the basis of general appearance (skin colour and mucus), stiffness of muscle, and consistency of belly cavity, colour and shape of eyes, colour and odour of gills, (Table 1). Each panelist evaluated duplicate of samples hourly during the display period. Microbiological counts were also determined during the on-set and end of the display period.

RESULTS AND DISCUSSION

Economic cost benefit

After the construction of the improved retail table, 157.14% increment on the cost of the traditional open table was observed when compared with the construction cost of improved retail table.

Changes in fish deterioration qualities

Alestes nurse wase used in this study because of its availability and economic importance in the Kainji lake area. Tables 2 and 3 show the cumulative values recorded by penalists as fish quality deteriorates as display time progressed. Quality parameters were generally intact at the first hour, however, as storage time progressed scores by panelists varied depending on the quality attribute assessed.

For *A. nurse*, the samples in the open table generally showed a higher degree of deterioration by panelists indicating higher spoilage with the display time. The gills and intestine recorded faster deterioration starting from fourth and fifth hours for samples in the open table. The deterioration of samples in the improved table was prolonged by one hour for both parameters. Score for skin brightness and texture did not show any deterioration throughout the storage period. Maggots were observed in the gills and mouth parts of samples in the open table. This result agrees with earlier results of (Ngwu, *et al.*,2010) where *Auchenoglenis occidentalis* where displayed under similar conditions.

At the onset of the experiment, there was no significant difference in the microbial counts

of fish on both tables. This is because freshly caught fish are sterile as the activity of the living fish keeps the microorganism under control. However, at the end of storage period, samples in the screened table recorded lower counts 1.5 x 10^4 cfu/g than those in the unscreened table 3.7 x 10^7 cfu/g.

CONCLUSION

Fish products displayed on NIFFR improved table had prolonged uniform product quality which are the most important aspects taken into consideration when buying fish products where prolonged.

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Table 1: Sensory Characteristics and Scores Used In the Panel Score Sheet

Appearance	Skin (both dark and white side)	Bright, iridescent pigmentation	0
		Bright but not lustrous	1
		Dull, becoming discolored	2
		Dull and discolored pigmentation	3
Consistency	Texture (black side)	Rigid (This demerit point is given only to fish still in rigor.)	0
		Firm and elastic	1
		Slightly soft, less elastic	2
		Very soft	3
	Belly	Firm elastic	0
		Soft	1
		Burst	2
Eyes	Shape	Convex	0
		Convex but slightly sunken	1
		Flat	2
		Sunken	3
Gills	Colour	Bright light rose-red	0
		Pale rose-red	1
		Slightly discolored, especially at the end of gill filaments	2
		Brown, yellowish, gray	3
	Odour	Fresh marine and seaweed-like	0
		Neutral	1
		Slight of fish, acid, some unpleasant smell Very unpleasant smell, rotten	2 3
Total			27

Table 2: *Alestes nurse* in open table

General appearance	1(H)	2(H)	3(H)	4(H)	5(H)	6(H)	7(H)	8(H)	9(H)
Skin	bright	bright	bright	bright	bright	dull	dull	dull	Dull
Stiffness	elastic	elastic	elastic	firm	firm	firm	firm	firm	firm
Belly	firm	firm	firm	firm	soft	soft	soft	soft	soft
Smell	fresh	fresh	fresh	fresh	fresh	fresh	fresh	fresh	fresh
Eye	convex	convex	convex	convex	convex	Concave	concave	concave	Concave
Gills	bright	bright	bright	dull	dull	dull	dull	dull	dull

Table 3: *Alestes nurse* inside the improved table

General appearance	1(H)	2(H)	3(H)	4(H)	5(H)	6(H)	7(H)	8(H)	9(H)
Skin	bright	bright	bright	bright	bright	bright	bright	bright	bright
Stiffness	elastic	elastic	elastic	elastic	elastic	firm	firm	firm	firm
Belly	firm	firm	firm	firm	firm	firm	soft	soft	soft
Smell	fresh	fresh	fresh	fresh	fresh	fresh	fresh	fresh	fresh
Eye	convex	convex	Convex	convex	convex	convex	convex	concave	concave
Gills	bright	bright	bright	bright	dull	dull	dull	dull	dull

Key: H- Hour